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EXAMINER	
WOZNIAK, JAMES S	
ART UNIT	**PAPER NUMBER**
2655	

DATE MAILED: 02/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/832,132	CHEN, JUIN-HWEY
	Examiner	**Art Unit**
	James S. Wozniak	2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/14/2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12,13,15,16,18,20-27,29-38,40-43,45 and 47* is/are rejected.

7)☒ Claim(s) *11,14,17,19,28,39,44 and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/9/2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the office action from 6/18/2004, the applicant has submitted an amendment, filed 9/14/2004, amending Claim 29, while arguing to traverse the art rejection based on the limitation regarding the derivation of a zero-input response error vector and a zero-state response error for each VQ codevector *(Amendment, Pages 19-20)*. Applicant's arguments have been fully considered, however the previous rejection is maintained due to the reasons listed below in the response to arguments.

2. The examiner has considered the newly filed IDS from 11/9/2004.

Response to Arguments

3. Applicant's arguments have been fully considered but they are not persuasive for the following reasons:

- With respect to **Claims 1 and 29**, the applicant argues that Marcellin et al (Advances in Speech Coding; Pub. Kluwer Academic Publishers, March 5, 1992) and Watts et al (IEEE CH2535-3/88/0000-0275) fail to teach deriving a zero-input response error vector and a zero-state response error for each VQ codevector, first stating that Marcellin does not teach the aforementioned

limitations for speech samples known as vectors *(Amendment, Page 20)*. The examiner notes that it is the combination of Marcellin and Watts that teaches the aforementioned claim limitations *(Prior office action, Page 5)*.

Marcellin teaches processing steps that are functionally equivalent to the presently claimed invention *(Prior office action, Page 5)*, although, as noted by the applicant on Page 20 of the amendment, Marcellin "uses Trellis Coded Quantization (TCQ) rather than vector quantization." Marcellin and Watts are related because the trellis is a well-known structure in the speech processing art that comprises multiple vectors. While the use of TCQ in Marcellin does not specifically teach the use of individual speech vectors, it is the inclusion, which would have been obvious to one of ordinary skill in the art, at the time of invention, of Watts that provides the teaching of zero state and zero input response vectors for the added benefit of speech processing complexity reduction as is noted in the prior office action (Page 5).

Secondly, the applicant argues that Watts does not teach a zero-input or state response error vector *(Amendment, Page 21)*, however, as is noted above, Watts teaches zero input and state response vectors for use in error-related processing. Specifically, Watts teaches that zero state and input response vectors are used to calculate a reconstruction error *(Pages 275-277, Sections 2-3)*. Thus, since the zero state and input response vectors are utilized in reconstruction error calculation to properly correct a speech signal by selecting the codevector having the lowest error, they are a functional equivalent of the currently claimed zero

input and state response error vectors since both the zero input and states responses taught by Watts are vectors of a reconstruction error. Thus the combination of Marcellin and Watts teaches the limitations of Claims 1 and 29.

- With respect to **Claim 20**, the applicant argues that Watts fails to teach the step of deriving a total quantization error energy for one of the codevectors in a sequence *(Amendment, Page 24)*, however the limitations of Claim 20 are fully taught with respect to the combination of Marcellin in view of Watts (prior office action, Pages 10-11), wherein Marcellin teaches the method steps, while Watts recites the use of individual speech vectors as previously addressed in claims 1 and 29 of the non-final office action (Page 5) and is obvious in combination with Marcellin for the reasons given with respect to those claims. Thus the rejection of Claim 20 is maintained.
- The rejected dependent claims are argued as being dependent upon respective independent claims *(Amendment, Pages 22 and 24)*. Therefore, since the rejection of the independent claims is maintained, the rejected dependent claims also remain rejected.

Allowable Subject Matter

4. Claims 11, 14, 17, 19, 28, 39, 44, and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In regards to **claims 11, 14, and 39**, the claim language that refers to the filtering in step (c)(i) Is based on an initially zeroed filter state, and wherein step (c) further comprises the step of: (c)(iii) zeroing the filter state to produce the initially zeroed filter state before each pass through step (c)(i) is not taught in prior ad. Sugihara (U.S. Patent: 5,5493,296) teaches that the detecting means where the signal value fed back to the quantizer is set to zero when the detection means detect that the number of bits of the input signal is less than that of the output signal (CoI 2, Lines 12 - 19).

In regards to **claims 19 and 46**, the combination of Marcellin et al. and Watts et al. disclose the speech signal comprises a sequence of speech vectors each including a plurality of speech samples, the method further comprising the steps of: deriving a gain value based on the speech signal once every M speech vectors, where M is greater than one; scaling the N VQ codevectors the once every M speech vectors based on the gain value; and deriving the N error vectors in step (c) only when the gain value is derived the once every M speech vectors, whereby a same set of N error vectors is used in selecting each of M preferred codevectors in step (d) corresponding to the M speech vectors.

In regards to **claims 17 and 44**, the combination of Marcellin and Watts et al. do not teach the speech signal comprises a sequence of speech vectors each including a plurality of speech samples, the method further comprising the steps of: deriving a set of filter parameters based on the speech signal once every T speech vectors, where T is greater than one; and performing step (c) only when a set of filter parameters is derived the once every T speech

vectors, whereby a same set of N error vectors is used in selecting each of T preferred codevectors in step (d) corresponding to the T speech vectors.

In regards to **claim 28**, the claim language that refers the step (d) comprises solving the equation below for y.sub.j 36 (n N j g 2 (n) H T (n) H (n)] y j = [n N j g (n) H T (n) qzi (n)] ,where y.subj represents an updated codevector resulting from updating the one of the N codevectors to minimize the total quantization error energy, g(n) represents a codevector scaling factor, H(n) represents a codevector filter transfer function, and qzi(n) represents a ZERO-INPUT response could not be identified in the prior art.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. **Claims 1 - 10, 12 -13, 15 -16, 18, 20 - 27, 29-38, 40-43, 45 & 47** are rejected under 35 U.S.C. 103(a) as being unpatentable over Marcellin et al (Advances in Speech Coding', Pub. Kluwer Academic Publishers, March 5, 1992) in view of Watts et al (IEEE CH2535-3/88/0000-0275).

In regards to claims 1 & 29, Marcellin et al. disclose a Noise Feedback Coding (NFC) system, a method of efficiently searching N predetermined Vector Quantization (VQ) codevectors for a preferred one of the N VQ codevectors to be used in coding a speech or audio signal (Fig 1), comprising the steps of: (a) predicting the speech signal to derive a residual signal (Page 48, Paragraph 3); (b) deriving a response error vector common to each of the N VQ codevectors (Page 48, Paragraph 3 - Page 49, Paragraph 2); (c) deriving N response error vectors each based on a corresponding one of the N VQ codevectors (Page 50, Paragraphs 1 - 2); and (d) selecting the preferred one of the N VQ codevectors as the VQ output vector corresponding to the residual signal based on the response error vector and the N response error vectors (Page 50, Paragraph 2 - Page 51 - Paragraph 1; Eqn 10). Marcellin et al. do not disclose language that explicitly deals with ZERO-INPUT or ZERO-STATE Response VQ Codevectors. However, Watts et al. teaches ZERO-INPUT Response and ZERO-STATE Response in relation to VQ codevectors. The ZERO-STATE and ZERO-INPUT Response vectors are used in noise feedback coding systems to reduce the complexity of the system while delivering the same output performance.

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to modify Marcellin et al. with the use of ZERO-INPUT and ZERO-STATE response/vectors as taught by Watts et al. since it would have decreased the complexity of the system while maintaining the accuracy.

In regards to **claims 2 & 30**, Marcellin et al. disclose the step of: separately combining the response error vector with each one of the N response error vectors to produce an error energy value corresponding to each one of the N VQ codevectors, wherein step (d) comprises selecting one of the N VQ codevectors corresponding to a minimum error energy value as the preferred one of the N VQ codevectors (Page 49, Paragraph 1). *(Marcellin describes a relationship for the noise feedback filter where a factor μ is chosen with the goal of suppressing the noise spectrum in frequency bands where the input speech has low energy content, thereby decreasing or minimizing the audibility of the reconstruction noise. The noise spectrum is used to calculate the VQ error energy values).*

In regards to **claims 3 & 31**, Marcellin et al. disclose the step (b) comprises the steps of: (b)(i) deriving an intermediate vector based on the residual signal (Page 49, Paragraph 2); (b)(ii) predicting the intermediate vector to produce a predicted intermediate vector (Page 49, Paragraph 2); (b)(iii) combining the intermediate vector with the predicted intermediate vector and a noise feedback vector to produce the response error vector (Eqn. 7 - 10); and (b)(iv) filtering the response error vector to produce the noise feedback vector (Eqn. 4).

In regards to **claims 4 & 32**, Marcellin et al. disclose the step (b)(ii) comprises long-term predicting the intermediate vector to produce the predicted intermediate vector (Fig 1(P_L)); and step (b)(iv) comprises long- term filtering the response error vector to produce the noise feedback vector (Page 49, Paragraph 2).

In regards to **claims 5 & 33**, Marcellin et al. disclose step (b)(ii) comprises predicting the intermediate vector based on an initial predictor state corresponding to a previous preferred codevector (Eqn 6); and step (b)(iv) comprises filtering the response error vector based on an initial filter state corresponding to the previous preferred codevector (Eqn. 7 - 9).

In regards to **claims 6 & 34**, Marcellin et al. disclose the step (b) comprises the steps of: (b)(i) combining the residual signal with a noise feedback signal to produce an intermediate vector (Fig. 1, Page 48); (b)(ii) predicting the intermediate vector to produce a predicted intermediate vector (Page 48, Paragraph 3 - Page 49, Paragraph 1); (b)(iii) combining the intermediate vector with the predicted intermediate vector to produce an error vector (Fig 1 (r_i)) [The residual is the error signal that is the difference between the actual speech signal and the modeled/filtered version of the speech signal]; and (b)(iv) filtering the error vector to produce the noise feedback vector (page 49, Eqn 4).

In regards to **claims 7 & 35**, Marcellin et al. disclose step (b)(ii) comprises long-term predicting the intermediate vector to produce the predicted intermediate vector; and step (b)(iv)

comprises short-term filtering the error vector to produce the noise feedback vector (Pages 48 - 49).

In regards to **claims 8 & 36**, Marcellin et al. disclose step (b)(ii) comprises predicting the intermediate vector based on an initial predictor state corresponding to a previous preferred codevector (Fig 1, Eqn 3); and step (b)(iv) comprises filtering the error vector based on an initial filter state corresponding to the previous preferred codevector (Eqn 3).

In regards to **claims 9 & 37**, Marcellin et al. disclose the step (c) comprises the steps of: (c)(i) separately filtering an error vector associated with each of the N VQ codevectors to produce a input vector corresponding to each of the N VQ codevectors (Page 49, Paragraph 1); and (c)(ii) separately combining each input vector from step (c)(i) with the corresponding one of the N VQ codevectors, to produce the N error vectors (Page 49, Paragraph 2).

In regards to **claims 10 & 38**, Marcellin et al. disclose the filtering in step (c)(i) comprises shod-term filtering of the error vector (Fig 1(P_s)).

In regards to **claims 12 & 40**, Marcellin et al. disclose the step (c) comprises the steps of: (c)(i) separately combining each of the N VQ codevectors with a corresponding one of N filtered, error vectors to produce the error vectors; and (c)(ii) separately filtering each of the N error vectors to produce the N filtered, error vectors (Eqn. 5 - 10).

In regards to **claims 13 & 41**, Marcellin et al. disclose the filtering in step (c)(ii) comprises short-term filtering (Fig 1(P_s)).

In regards to **claims 15 & 42**, Marcellin et al. do not disclose the steps of: deriving a gain value based on the speech signal; and scaling at least some of the N VQ codevectors based on the gain value. However, Watts et al. teach a gain adaptive vector quantization based on fixed Iognorm prediction. In addition, Watts teach scaling at least some of the N VQ codevectors based on the gain value (Watts, Fig. 1 (b - c)). The high gain scalar predictor helps to reduce the complexity while preserving the performance of the encoder.

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to modify Marcellin et al. by deriving a gain value and scaling of the N VQ codevectors based on the gain value as taught by Watts et al. since it would have decreased the complexity of the system while preserving the quality of the encoding process.

In regards to **claims 16 & 43**, Marcellin et al. disclose the steps of: deriving a set of filter parameters based on the speech signal; and filtering the N VQ codevectors in step (c)(ii) based on the set of filter parameters (Eqn. 5 - 6).

In regards to **claims 18 & 45**, Marcellin et al. disclose the speech signal comprises a sequence of speech vectors each including a plurality of speech samples, the method further comprising the step of: performing step (c) once every T speech vectors, where T is greater than

one, whereby a same set of N error vectors is used in selecting T preferred codevectors in step (d) corresponding to the T speech vectors (Watts, Page 9.2.1 - 9.2.2, Section 2).

In regards to **claim 20**, Marcellin et al. disclose a method of deriving a final set of N codevectors useable for prediction residual quantization of a speech or audio signal in a Noise Feedback Coding (NFC) system (Fig 1), comprising the steps of: (a) deriving a sequence of residual signals corresponding to a sequence of input speech training signals (Page 48, Paragraph 3); (b) quantizing each of the residual signals into a corresponding preferred codevector selected from an initial set of N codevectors to minimize a quantization error associated with the preferred codevector, thereby producing a sequence of preferred codevectors corresponding to the sequence of residual signals (page 48, Paragraph 3 - Page 49, Paragraph 2); (c) deriving a total quantization error energy for one of the N codevectors based on the quantization error associated with each occurrence of the one of the N codevectors in the sequence of preferred codevectors (Page 49, Paragraph 1). [Marcellin describes a relationship for the noise feedback filter where a factor μ is chosen with the goal of suppressing the noise spectrum in frequency bands where the input speech has low energy content, thereby decreasing the audibility of the reconstruction noise. The noise spectrum is used to calculate the FQ error energy values]; and (d) updating the one of the N codevectors to minimize the total quantization error energy (Fig 1).

In regards to **claim 21**, Marcellin et al. disclose further comprising the step of: (e) repeating steps (c) and (d) for each of the codevectors in the set of N codevectors, thereby updating each of the N codevectors to produce an updated set of N codevectors (Fig 1).

In regards to **claim 22**, Marcellin et al. disclose the step of: (f) continuously repeating steps (b)-(e) using each updated set of N codevectors as the initial set of N codevectors in each next pass through steps (b)-(e), until the final set of N codevectors is derived (Page 50).

In regards to **claim 23**, Marcellin et al. disclose step (f) comprises the steps of: deriving a quantization error energy measure associated with each updated set of N codevectors from step (e)(Eqn 8); selecting an updated set of N codevectors from step (e) as the final set of N codevectors when an error energy difference between the quantization error energy measure associated with the final set of N codevectors, and the quantization error energy measure associated with a previously updated set of N codevectors is within a predetermined error energy range (Page 49, Paragraph 1, Page 50).

Regarding **claims 24 & 25**, Marcellin disclose that the codevectors has a vector-dimension of one or more, whereby each of the codevectors represents a scalar quantity or vector quantity respectively (page 50) [Marcellin et a/. describes scalar and vector quantization. It is inherent in the definition that a scalar quantity has a dimension of one and the vector quantization has a dimension greater than one].

In regards to **claim 26**, Marcellin et al. disclose wherein step (b) comprises: (b)(i) deriving a ZERO-INPUT response error vector common to each of the N codevectors; (b)(ii) deriving N ZERO-STATE response error vectors each corresponding to one of the N codevectors (Page 48, Paragraph 3- Page 49, Paragraph 2);; (b)(iii) separately combining the ZERO-INPUT response vector with each of the ZERO-INPUT response error vectors to produce

N quantization error energy values each corresponding to one of the N codevectors (page 49, Paragraph 2); and (b)(iv) selecting one of the N codevectors corresponding to a minimum one of the N quantization error energy values as the preferred codevector (Page 49, Paragraph 1).

In regards to **claim 27**, Marcellin et al. disclose step (b)(ii) comprises the steps of: combining each of the N codevectors with a corresponding feedback signal to produce the N ZERO-STATE response vectors (Eqn. 5 - 10); and separately short-term filtering each of the N ZERO-STATE response vectors to produce each said corresponding feedback signal (Fig 1(P_s)).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (703) 305-8669 and email is James.Wozniak@uspto.gov. The examiner can normally be reached on Mondays-Fridays, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached at (703) 305-4827. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak
12/16/2004

DAVID L. OMETZ
PRIMARY EXAMINER